

WHAT IS CLAIMED IS:

1 1. A process for producing an SiO₂ shaped body which is at least
2 partially vitrified, comprising sintering and/or vitrifying an amorphous, porous SiO₂
3 green body by contactless heating by means of radiation, wherein the radiation
4 employed comprises a laser beam, and sintering and/or vitrifying takes place at a
5 subatmospheric pressure below 1000 mbar.

1 2. The process of claim 1, wherein the subatmospheric pressure
2 is such that any bubbles which form in the SiO₂ shaped body have a lower internal
3 pressure than the pulling pressure used to pull a single crystal in a subsequent
4 crystal pulling process in which said shaped body is used.

1 3. The process of claim 1, wherein, before a subatmospheric
2 pressure is established, the SiO₂ green body is held in a helium atmosphere.

1 4. The process of claim 1, wherein said laser has a beam
2 wavelength which is greater than the absorption edge of silica glass at 4.2 µm.

1 5. The process of claim 1, wherein a CO₂ laser with a beam
2 wavelength of 10.6 µm is used.

1 6. The process of claim 1, wherein the amorphous, porous SiO₂
2 green body is in the shape of a crucible.

1 7. The process of claim 1, wherein the inner side and the outer
2 side of the SiO₂ green body is irradiated by a laser beam with a focal spot diameter
3 of about 2 cm or greater, and is thereby sintered or vitrified.

1 8. The process of claim 1, wherein the irradiation takes place
2 uniformly and continuously on the respective side or sides of the green body to be
3 sintered and/or vitrified.

1 9. The process of claim 1, wherein the vitrification and/or
2 sintering of the surface of the SiO₂ green body takes place at temperature between
3 1000 and 2500°C.

1 10. The process of claim 1, wherein the vitrification and/or
2 sintering of the surface of the SiO₂ green body takes place at temperature between
3 1300 and 1800°C.

1 11. The process of claim 1, wherein the vitrification and/or
2 sintering of the surface of the SiO₂ green body takes place at temperature between
3 1400 and 1500°C.

1 12. The process of claim 1, wherein the laser energy is applied
2 to the surface of the green body at an energy density of 50W/cm² to 500W/cm².

1 13. The process of claim 1, wherein the laser energy is applied
2 to the surface of the green body at an energy density of 100 W/cm² to 200 W/cm².

1 14. The process of claim 1, wherein the temperature of the focal
2 spot of the laser on the green body is measured, and the measurement is used to
3 adjust process parameters such that variation in the energy density applied to the
4 green body is reduced.

1 15. A process for the locally delimited vitrification and/or
2 sintering of a porous, amorphous SiO₂ green body having an inner side and an outer
3 side, by the process of claim 1, wherein only the inner side or only the outer side
4 of the SiO₂ green body is irradiated in a surface-covering manner with a laser and
5 is thereby sintered or vitrified.

1 16. An SiO₂ shaped body, prepared by the process of claim 15
2 which is completely vitrified on the inner side and has open pores on the outer side.

1 17. The SiO₂ shaped body of claim 16, which is a silica glass
2 crucible for pulling silicon single crystals using the CZ process.

1 18. The SiO₂ shaped body of in claim 17, wherein the outer side
2 of the silica glass crucible or a portion thereof is impregnated with one or more
3 substances which induce or accelerate crystallization of the outer side during a
4 subsequent CZ process.

1 19. An SiO₂ shaped body having an inner side and an outer side,
2 which is completely vitrified on the outer side and has open pores on the inner side,
3 prepared by the process of claim 1.

1 20. The SiO₂ shaped body of claim 16 having no more than 40 air
2 bubbles per cm³ taken as a mean over the entire area which has been completely
3 vitrified, with the diameter of the air bubbles being no greater than 50 µm.

1 21. A device for vacuum laser sintering suitable for use in the
2 process of claim 1, comprising: a laser, a holding device for a product to be
3 sintered and movable in three axes, the laser and the holding device configured with
4 a seal which seals off said holding device with respect to the outside such that
5 subatmospheric pressure can be established therein and allows a beam from said
6 laser to enter said holding device.

1 22. A device of claim 21, wherein the seal comprises a bellows.

1 23. The device of claim 21, wherein the seal comprises a rotary
2 vacuum seal.

1 24. The device of claim 21, wherein said device comprises a
2 vacuum chamber having a concave spherical depression therein and at least one
3 passageway in said depression communicating with the interior of said vacuum
4 chamber; and said seal comprises a rotary vacuum seal comprising a vacuum
5 chamber contacting portion having a convex spherical surface which mates with the

6 concave spherical depression of said vacuum chamber, said seal further comprising
7 a laser beam transparent window such that the laser light can pass through said
8 window and through said seal and impinge upon a body contained in said vacuum
9 chamber.